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ABSTRACT

Because analogies are such powerful tools for communicating they should be exploited more consciously for instructional purposes. Unfortunately, analogies as a topic of investigation in the school curriculum tend to surface only as a subheading within a figurative language lesson in English class or as a test item on the SAT, MAT, or GRE. Analogy exercises can be used in a wide variety of other teaching situations. A student might be asked, for example, to think up an analogy for feudalism, prejudice, photosynthesis, or organizational behavior. Converting understandings of different subject matter concepts and processes and competing philosophies within a field into analogies can help students to better grapple with them and concretize their thinking. Also, analogies can provide teachers with a very effective, though perhaps not foolproof, way of gauging how information is being understood by a student. A bibliography and two exercises--one on teaching and the other on leadership analogies--are attached. (Author/LLS)

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USING ANALOGIES TO DEVELOP CONCEPTUAL ABILITIES

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Sally Jorgensen

USING ANALOGIES TO DEVELOP CONCEPTUAL ABILITIES

Analogical thinking has always been a potent tool of poets and novelists and philosophers. Take, for instance, these lines from T.S. Eliot:

> Twelve o'clock.
> Along the reaches of the street
> Held in lunar synthesis,
> Whispering lunar incantations
> Dissolve the floors of memory
> And all its clear relations
> Its divisions and precisions,
> Every street lamp that I pass
> Beats like a fatalistic drum
> And through the spaces of the dark
> Midnight shakes the memory
> As a madman shakes a dead geranium.

Or these lines from Anne Sexton's poem, "For my Lover, Returning to his Wife:"

> As for me, I am watercolor.
> I wash off.

Consider, too, how powerfully communicative of the complex tenets of Existentialism is Camus's depiction of Sisyphus rolling the stone up the hill, over and over and over again, knowing the are no reasons for doing it other than doing it, knowing there are no guarantees it will not fall back down again.

Effective teachers, psychotherapists and communicators in general also employ metaphors - consciously or unknowingly - to express otherwise hard-to-convey meanings. Gavriel Salomon a couple of weeks ago at AERA commented that Australians perceive television as "moving wallpaper," a line which recalls Fred Allen's marvelous metaphor that television is "bubble gum for the eyes."

Metaphors (and analogies) are a way of articulating insights, jolting perspectives, and illustrating the most abstract ideas despite metaphors' usual reliance upon concrete, everyday phenomena. William J.J. Gordon in his 1961 book Synectics and later book, The Metaphorical Way of Learning and Knowing (1970) considers that "the basic mechanism for generating creativity is metaphoric activity." Metaphors, in other words, may just be the key to understanding the creative process.

It should be noted, by the way, that the terms "metaphor" and "analogy" are used interchangeably in this paper, though some authors, such as Andrew Ortony, make subtle distinctions between the two. Analogy, for example, is equated with a comparison, both terms are more explicit, whereas metaphor implicates a comparison and is thus more subtle and more figurative. Analogy, too, may conjure a syllogistic sequence: A is to B as C is to D. Or one might make a case for using the term "analogy" as a common denominator thought process underlying hyperbole, simile, metaphor, symbolism, and allegory. Such semantic analyses of the terms are provocative but are not

the main focus of this paper. Thus, for our purposes, the points made about analogies apply equally to metaphors and similes. (See footnote on page 4 for another perspective on the terminology problem.)

Analogies as a topic of investigation in the school curriculum tend to surface only as a subheading within a figurative language lesson in English class or as a test item students should be prepared to encounter on the S.A.T., M.A.T. or G.R.E. Yet this simple linguistic device has enormous potential for tapping and developing a facility for visual thinking - and nurturing both creative and critical thinking abilities. Gordon writes, "metaphor introduces conceptual distance between the student and the subject matter which is conducive to innovation and imagination, to 'breaking set.' Analyzing the adequacy of the metaphor forces the individual into seeing familiar situations in new contexts and from new viewpoints." It can be helpful also for "getting unfamiliar topics or problems under control and internalized. That is, a familiar analogy puts unfamiliar subject matter into a recognizable language so that it can be clarified and organized." In short, according to Gordon, analogies can make the familiar strange and the strange, familiar.

An analogy is defined as "a resemblance in some particulars between things otherwise unlike: similarity." Though the definition doesn't capture how vivid and potent an analogy can be as a conceptual and communicative tool; it does note, nevertheless, an analogy's essential ingredients: seeing resemblances where none objectively and denotatively exists. Ortony distinguishes between literal and nonliteral similarities of a metaphor. The more literal the similarities, the more likely one is dealing with synonyms. The less literal, the more metaphoric the relationship - and perhaps the more creative. An interesting point Ortony makes about nonliteral metaphors is that tend not to be reversible. A precedes B, but B doesn't work as well or at all if it precedes A. (I see this as being a little like trying to reverse the order of telling a joke by putting the punchline first.) An illustration of this point cited in Ortony is: "Billboards are like warts." Reversing the simile - "Warts are like billboards" doesn't quite work and certainly doesn't make the same point or lead one to the same insight. Yet more literal analogies, such as synonyms, are reversible. No great shifts of meaning result from reversing the following two statements, for example: A billboard is like a placard. A placard is like a billboard.

If one were to run analogies through Bloom's Taxonomy of Cognitive Levels, one might be surprised to discover that the act of devising an analogy - the nonliteral kind - employs probably four and potentially five cognitive processing levels: knowing, comprehending, analyzing, synthesizing and possibly evaluating. How analogies call forth knowing and comprehending abilities is probably obvious. "Analyzing" is performed in the act of critically comparing and contrasting the two terms and their salient attributes. "Synthesizing" is performed when a meaning, an insight is arrived

at that is greater than the additive meanings of the two terms. This level may elude simple, precise explication. "Evaluating" may or may not be performed, depending on whether a positive or negative value judgement is present in the analogy. This level may also defy easy interpretation and translation. The April 21, 1980, issue of The New Yorker in its characteristic style of droll understatement provides a good illustration of the frequently elusive, but, paradoxically, very insightful character of analogical relationships. The following are descriptions of what make the candidates tick:

CARTER

> The central cavity is filled with natural uranium, which is constantly scanned by a Zeiss optical system. Random fluctuations of electrons are controlled by meditation, and the dark clouds of ash vented from the abyss are borne away by high winds. The apparatus as a whole can be swung in various directions, as it swivels about its main pivot.

KENNEDY

> Small sprocket wheels pull the film off the feed reel and feed it to the takeup reel. In time, it reaches the sound head. The device is capable of transmitting coded information, in twelve-track Dolby, to surface facilities as far away as forty feet.

REAGAN

> The clockwork drive, of the type developed in the first half of the nineteenth century, has been granulated and introduced through a hopper into the turret of an amphibious combat vehicle. For safety, the muzzle has been equipped with a warning signal. Engineers have not actually been able to get this model to tick yet, but with proper maintenance it may be struck manually to sound the quarter hour.

-- Veronica Geng

Another example of an evaluative analogy is Representative Fisher of Virginia's recent comparison of congressmen with musk oxen: when threatened, they both form tight circles and protect their turf. Still another analogy with an embedded value judgement is one found occasionally in women's bathroom stalls (perhaps men's too, however, I have a limited frame of reference) and lapel buttons: "A woman without a man is like a fish without a bicycle." And if you doubt that that's evaluative, just ask a randomly sampled male if he thinks it's a neutral, value-free analogy, administer a galvanic skin response test and see what happens.

Analogies can entail a high level of abstract ability. Comprehending and devising them depends, not only, of course, on one's familiarity with both terms in the analogy (especially the first term, points out Ortony, due to its being the ground, the basic referent of the analogy), but grappling with analogies depends also on

some amorphous trait inside the Black Box called intelligence. Analogies (especially further out on the continuum toward "nonliteral similarities"), as well as proverbs and symbolism, are generally difficult for the mentally retarded to grasp. These individuals themselves tend to be too literally minded and their language usage too concrete and tied to direct experiences to be very facile at the abstract playfulness, feature selectivity, and reciprocal interlacing of attributes that analogies require.

A dimension of analogies that Webster overlooked is that they tend to involve visualizable referents. (Perhaps he just wasn't apprised of the virtues of the right hemisphere, or maybe lexicographers by nature have dominant left hemispheres.) Actually analogies nicely mesh verbal and visual processing. Simple verbal handles can represent quite ineffable, nonverbal conceptualizations.

Imagine how much more insight-producing and effective it might be for a psychotherapist to employ metaphors rather than intellectualized jargon in discussing clients' patterns of behavior in order not to further disconnect their head from their gut. An example would be to refer to reasons behind behaviors as Having emotional payoffs, rather than putting diagnostic labels on reasons, and potentially reinforce, as opposed to confront in a supportive way, self-destructive behaviors. Another example would be where the therapist refers to the client's style of relating to others as attempts to accumulate psychological "green stamps" which at periodic intervals s/he will cash in on, "redeem for payment." How much more personal and impactful are these ways of reframing an individual's self-perceptions than are textbook terminologies.

Another characteristic of analogies which is meaningful is to think of them in terms of the two categories of convergent and divergent. "Convergent" refers to exercises which will converge on a predetermined best answer. "Divergent" refers to open-ended, unspecified and perhaps even multiple responses, which might also involve more connotative, personally meaningful associations between the words. The Miller Analogies Test or S.A.T. analogy test items ask for the former, for convergent type of responses: both terms of the analogy are given, and there is presumably only one best equation for them. Ironically, the more creative and free associative a person is and capable of generating lots of fresh and original parallels between the terms, the worse s/he will probably do on these analogy tests (unless one knows the "trick" of taking analogy tests and can shift one's cognitive strategies into the appropriate gear). Standardized analogy tests are <u>not</u> testing creativity. They are testing reasoning

*It is interesting to note that "metaphor" connotes creativity while "analogy" tends to connote reasoning ability. The confusion may be less related to the inherent definitions of the terms but to the different types of thought processes and end goals each is representing. The differences have, respectively, to do with personal association processes (divergent methods) versus a convergent process drawing upon objective, dictionary-type knowledge. Examining the thought processes and end goals is key to the semantic distinctions, therefore.

These exercises require logical, predominantly linguistic processing, and draw upon objective, socialized, "dictionary" knowledge. The trick in doing well on these items is to systematically run through denotative characteristics of the two terms and do what Ortony calls "attribute-matching" of the most salient features...a process somewhat akin to a computer scanning procedure. Convergent uses of analogies can be found in classroom instruction as well, when, for instance, a teacher cites the classic analogy of the rising elevator moving through space to elucidate Einstein's otherwise esoteric equation.

A divergent approach, on the other hand, involves a more fluid, self-generated thinking process. A certain perspective, an insight, may precede devising a more concrete, analogical means of expressing the understanding. (This method is the opposite required of convergent, standardized analogies test situations.) Also, coming across something interesting, for example, in an area different from one's normal frame of reference can trigger an analogical association with something one already understands or has been percolating about. Reading about valences and bonding patterns of electrons can spark fresh associations about human relationships. Divergent processes can, in other words, involve a flow in either direction - the insight or understanding first, followed by an analogy which catches that awareness up into a specific referent or by coming upon information that seems to serve as a vivid representation for something already understood. The creation of the analogical association itself, too, can sharpen the individual's insight and render it more memorable.

Divergent analogy exercises might entail a teacher's either setting up the first term only and having students think up their own original analogies for ideas and principles being dealt with in the course. Chapter 14 of Joyce and Weil's Models of Teaching transcribes some of Gordon's metaphor exercises for students, such as giving them a paragraph on democracy and having them think of how various parts of the human body and their functions analogically match up with aspects of democracy. An example of supplying the first term and leaving the second completely open-ended are these sentences from Gordon (probably most applicable in a creative writing class):

1) Imagine that you are a spider who is trying to spin a web on a rainy, stormy day. Be the spider - what does the storm do to you and how do you feel about it? _____.

2) "Delicate armor" might describe _____.

3) An example of "repulsive attraction" is _____.

These last two are what Gordon refers to as "compressed conflict;" they are in fact oxymorons.

Or, as mentioned before, students might be responsible for devising their own analogies from scratch - their own analogy for democracy, for instance; or be asked to write a story from the perspective of an animate or inanimate object. (This latt empathy activity exemplifies what Gordon refers to as the "personal analogy.") An e

tremely important point that needs to be made, however, is that ANALOGIES ARE NOT JUST FUN ACTIVITIES IN CREATIVE WRITING CLASSES. THEY ARE ALSO MARVELOUS CONCEPTUALIZATION DEVICES WITHIN VIRTUALLY EVERY DISCIPLINE AND AT ALL LEVELS. A student might be asked to think up an analogy for feudalism, prejudice, photosynthesis, organizational behavior, George and Martha's relationship in Who's Afraid of Virginia Woolf?, or - as a friend of mine did after I showed him a teaching analogies exercise I had devised - use analogies to illustrate different models and philosophies within a particular field of study. He created a set of analogies depicting historical and currently competing perspectives of educational evaluation and had his students mark the best and worst descriptions of evaluation ... as a kind of pre-test, or baseline index of their understanding of the field of educational evaluation prior to being exposed to his course. At the end of the course he had the students do the exercise again, then returned their original papers. The comparison and changes in perspectives (hopefully there were changes) led to a very stimulating discussion and an opportunity for the professor to deal with any lurking misconceptions of evaluation. The analogy exercise was thus a fruitful stimulus for exchange, as well as a kind of pre- and post-test measure of learning.

As mentioned before, this exercise was triggered by one I had devised and which is currently used in several teacher education classes at Indiana University. It lists 17 different analogies of teaching; the objectives of the instrument are to sneak up on and surface students' perceptions of appropriate and inappropriate roles of teacher and student in the classroom, as well as provoke discussion of attitudes toward teaching and learning in general. The exercise could also be turned into a pre- and post-test activity. Here are a handful of examples from the 17 analogies on the instrument:

1) Teaching involves increasing the contents of a vessel from a lower to a higher level.
2) Teaching involves playing cross-examining attorney, challenging testimonies, and flushing out facts in pursuit of "truth."
3) Teaching is giving a student a mirror by which to view him/herself.
4) Teaching is a process of penetrating and illuminating the darkness. (From Postman and Weingartner's Teaching as a Subversive Activity.)
5) Teaching is like mountain-climbing where all involved help each other and work together to get where they're going.

Students check the two best and two worst definitions of teaching, depending on the size of the class - a smaller class could choose three best and three worst. The responses are then enumerated on an overhead transparency of abbreviations of the 17 analogies so that students can see the comparative positive and negative responses of the class. One set of tick marks could be in red and the other in green to differentiate the best from the worst choices. There is no right or wrong answer though obviously instructors will lean toward and away from certain choices. The best discussion

tends to evolve from analogies which receive both positive and negative responses. The follow-up discussion can go as deep as the instructor wants to take it as s/he attempts to unravel students' philosophies and assumptions regarding teaching and studenting. A person's checking "yes" to the statement, "Teaching is a process of penetrating and illuminating the darkness," for example, can lead to a debate about what students bring to schooling - are they internally dark or, to switch metaphors, a tabula rasa? It is also possible to have students generate their own analogies after the discussion to better express their individual conceptualizations of teaching.

I also created a similar analogy exercise related to leader-follower behaviors for a graduate course at I.U. in Leadership: Models and Strategies. A few examples from this exercise which list eleven alternative analogies follow:

1) Leadership is like coaching a football team - abiding by the rules, playing well together, and winning are what it's all about.
2) Leadership is like farming: the farmer is responsible for nutrients, a daily routine, and a controlled environment to promote optimal productivity.
3) Leadership means providing just the right amount of friction to turn grains of sand into pearls.
4) Leadership involves being the captain of a boat and risking to take it away from shore to venture into uncharted waters.

As with the evaluation and teaching analogies exercises, students rank their best and worst definitions. Then they take apart the components of the analogies to explain what they represented pro and con vis-à-vis leadership.

The possible uses of analogies in the classroom - in both convergent and divergent activities - are rich and varied. Match past Presidents of the United States with types of animals. Describe the action among the characters of A Streetcar Named Desire as a chemical reaction. Critique the presentation of ideas - the flow of the arguments - in a particular essay in the language of filmmaking and film editing. Describe an instructional package in the form of a Chinese menu. How is the mind like an onion? A computer? How is it not like an onion, not like a computer? (Knowing how aspects of the analogy are unlike is equally important for an accurate understanding of the basic concept being dealt with.) What is an analogy for Freud's perspective of the mind? Jung's? Skinner's? Needless to say, the crossfertilizations are endless and only limited by one's imagination. It is also important to note that the types of products resulting from analogy activities can be equally rich and varied. Products illustrating analogical relationships can take the form of a film, photos, abstract or representative pictures, collages, discussion, role-play, poems, stories, diary entries, scripts, models, diagrams - schemas - blueprints, or inquiry projects for alternative analogies used to describe the same phenomena as found in the media, for example.

One last use of analogies is to employ them strategically for the purpose of

problem-solving in social, instructional and organizational situations. George Prince in an article in the Harvard Business Review details how effective analogies can be in meetings, for example, when discussions get stuck. A fresh, seemingly unrelated analogy can jumble the mental molecules of the group and in turn shift the frames of reference so that solutions can be arrived at. At the stuck point, an analogy is introduced, members of the group brainstorm in response to it, then return to the original problem and devise fresh alternatives for dealing with it, sparked by the alternatives the analogy evoked. The particular problem George Prince discusses has to do with trying to design a new product to replace the conventional can. The meeting chairperson got the group off on a tangent of discussing cells and cell membranes, and ultimately some very creative solutions to the company's problem of designing a new container were arrived at.

In summary, if analogies are such naturally effective conceptual and communicative tools, why not exploit them more consciously for instructional purposes as well. Why not have students convert their understandings of different subject matter concepts and processes and competing philosophies within a field into analogies in order to better grapple with them and concretize their thinking. Also, analogies can provide teachers with a very effective, though perhaps not fullproof, way of gauging how information is being understood by a student. Determining a student's grasp of a complex concept is a frustrating task for teachers, instructional developers, evaluators and educational researchers. Mere regurgitation of the concept in the same or similar terms in which it was taught taps only the most elementary memory and comprehension abilities. Analogies involve a transformation process that requires not only comprehension, but also higher level analyses and syntheses of the material. In the meantime, too, some valuable creative and critical thinking skills are getting exercised.

In conclusion:

The end of this paper is to lunch* as

a) pain is to pleasure,

b) mind is to body, or

c) aardvarks are to zither.

*The paper was scheduled to be presented at noon one day during AECT.

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USING ANALOGIES TO DEVELOP CONCEPTUAL THINKING ABILITIES

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TEACHING ANALOGIES EXERCISE
Sally Jorgensen

Put a + next to two analogies below which best describe your view of teaching. Put a - next to the two which you consider the worst definitions.

____ 1. Teaching involves increasing the contents of a vessel from a lower to a higher level.

____ 2. Teaching is like generating electrical current in a powerhouse whereby raw energy is turned into productive forms.

____ 3. Teaching is like making a casserole: the student provides the equipment; the teacher provides the ingredients and the recipe and demonstrates how to make it. Student-made casseroles should be as similar to the teacher's as possible.

____ 4. Teaching involves playing Sherlock Holmes - searching for solutions to the "puzzle" of each student - utilizing logic, intuition, trial-and-error... whatever works.

____ 5. Teaching involves taking a student down a "tried and true" path toward a a specific destination to enable him/her to better determine his/her own path later.

____ 6. Teaching is providing a buffet of various foods that the student is free to taste, relish or binge on as s/he desires.

____ 7. Teaching is comparable to programming a computer: what comes out should resemble what goes in.

____ 8. Teaching is a chess game where players psych out each other's strategies and moves in order to win the game.

____ 9. Teaching involves playing cross-examining attorney, challenging testimonies and flushing out facts in pursuit of "truth."

____ 10. Teaching is a process of penetrating and illuminating the darkness.

____ 11. Teaching is like cultivating and fertilizing a vegetable garden so that different kinds of seeds can flourish (though one may or may not witness their harvest).

____ 12. Teaching is giving a student a mirror by which to view him/herself.

____ 13. Teaching is like teaching a person how to fish, rather than just giving him/her a fish.

____ 14. Teaching is like taming and training animals.

____ 15 Teaching is like running a health spa - exercising and developing flabby muscles of the mind.

____ 16. Teaching is like mountain climbing where all involved help each other and work together to get where they're going.

____ 17. Teaching is vaccinating the individual with injections of the hard realities of life so s/he becomes tough-skinned.

Sally Jorgensen

LEADERSHIP ANALOGIES

Put a plus (+) by what you consider the 2 best definitions of leadership within an an organization and a minus (-) by the two worst definitions.

_____1. Leadership is like coaching a football team -- abiding by the rules, playing well together and winning are what it's all about.

_____2. Leadership is like making a chef's salad and trying to enhance the identity and flavor of each ingredient yet having them all look and taste good together.

_____3. Leadership in an organization functions like a catalyst in a chemical reaction -- it isn't actually directly involved in the process but initiates or speeds it up.

_____4. Leadership is like farming: the farmer is responsible for nutrients, a daily routine and a structured environment that yield optimal productivity.

_____5. Leadership is like a railroad coordinator -- keeping lots of trains on their own tracks, warding off collisions and determining destinations.

_____6. Leadership is like playing poker: it requires a good hand, some risk-taking and probably a lot of bluffing.

_____7. Leadership is a strainer through which passes the needs, talents and goals of the organization.

_____8. Leadership means providing just the right amount of friction to turn grains of sand into pearls.

_____9. Leadership functions like a broker between the job requirements and the individual's talents and needs.

_____10. Leadership involves being the captain of a boat and risking to take it away from shore to venture into uncharted waters.

_____11. Leadership is similar to being the umpire in a baseball game rather than being the star pitcher.